Customer No.: 31561
Application No.: 10/064,503
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AMENDMENTS

1. (previously amended) An apparatus for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein

the second adsorbent comprises an X zeolite containing magnesium ion as an ion-exchangeable cation, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 40%.

Claims 2-3: canceled

4. (previously amended) An apparatus for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second

adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein

the second adsorbent comprises an X zeolite containing magnesium and calcium ions as ion-exchangeable cations, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 5%.

Claim 5: canceled

6. (previously amended) An apparatus for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein

the second adsorbent comprises an A zeolite containing calcium and magnesium ions as ion-exchangeable cations, and a magnesium-exchange ratio in total cations of the A zeolite is higher than 5%.

Claim 7: canceled

8. (original) The apparatus of claim 1, wherein a third adsorbing layer is disposed between the first adsorbing layer and the second adsorbing layer, wherein the third adsorbing layer comprises an adsorbent capable of selectively adsorbing CO_2 in the air.

9. (previously amended) A method for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

providing a purifying apparatus comprising an adsorber, the adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein the second adsorbent comprises an X zeolite containing magnesium ion as an ion-exchangeable cation, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 40%; and

using the first adsorbing layer to adsorb and remove water from the raw air and then using the second adsorbing layer to adsorb and remove the nitrogen oxides and/or the hydrocarbons from the raw air.

10. (original) The method of claim 9, wherein the second adsorbing layer also adsorbs and removes CO_2 from the raw air.

11. (original) The method of claim 9, wherein the purifying apparatus is used with a third adsorbing layer disposed between the first adsorbing layer and the second adsorbing layer, the

third adsorbing layer comprising an adsorbent capable of selectively adsorbing CO_2 and the method further comprising using the third adsorbing layer to adsorb and remove CO_2 from the air passing the first adsorbing layer.

12. (new) An apparatus for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein

the second adsorbent comprises an X zeolite containing magnesium ion as an ion-exchangeable cation, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 40%, wherein the X zeolite contains merely a trace of A zeolite as an impurity.

13. (new) An apparatus for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of

selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein

the second adsorbent comprises an X zeolite containing magnesium and calcium ions as ion-exchangeable cations, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 5%, wherein the X zeolite contains merely a trace of A zeolite as an impurity.

14. (new) An apparatus for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

an adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein

the second adsorbent comprises an A zeolite containing calcium and magnesium ions as ion-exchangeable cations without an X zeolite, and a magnesium-exchange ratio in total cations of the A zeolite is higher than 5%.

15. (new) The apparatus of claim 12, wherein a third adsorbing layer is disposed between the first adsorbing layer and the second adsorbing layer, wherein the third adsorbing layer comprises an adsorbent capable of selectively adsorbing CO_2 in the air.

16. (new) A method for purifying air used as a raw material in cryogenic air separation that separates nitrogen and oxygen mainly by distilling the air at low temperatures, comprising:

providing a purifying apparatus comprising an adsorber, the adsorber comprising an adsorption cylinder that comprises a first adsorbing layer and a second adsorbing layer, wherein the first adsorbing layer comprises a first adsorbent capable of selectively adsorbing water in the air and the second adsorbing layer comprises a second adsorbent capable of selectively adsorbing nitrogen oxides and/or hydrocarbons in the air passing the first adsorbing layer, wherein the second adsorbent comprises an X zeolite containing magnesium ion as an ion-exchangeable cation, and a magnesium-exchange ratio in total cations of the X zeolite is higher than 40%, wherein the X zeolite contains merely a trace of A zeolite as an impurity; and

using the first adsorbing layer to adsorb and remove water from the raw air and then using the second adsorbing layer to adsorb and remove the nitrogen oxides and/or the hydrocarbons from the raw air.

17. (new) The method of claim 16, wherein the second adsorbing layer also adsorbs and removes CO_2 from the raw air.

18. (new) The method of claim 16, wherein the purifying apparatus is used with a third adsorbing layer disposed between the first adsorbing layer and the second adsorbing layer, the